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Publication date:
2010

Document version
Early version, also known as pre-print

Citation for published version (APA):
Nejsum, P., Bertelsen, M. F., Betson, M., Stothard, J. R., Hamel, D., & Murrell, K. D. (2010). *Transmission of Ascaris suum among zoo primates - an emerging problem?*. Abstract from The XIIth International Congress of Parasitology, Melbourne, Australia.

Transmission of *Ascaris suum* among zoo primates – an emerging problem?

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Abstract

Chimpanzees (*Pan troglodytes*) in the Copenhagen Zoo frequently excrete ascarid worms onto the cage floor despite spite of regular anthelmintic treatment. Previously it was shown that the source of the infections was of porcine origin. However, it was unknown whether the recurrence of infection was due to reintroduction of eggs from an external source or to a sustained transmission cycle within the Zoo. We found that isolated eggs were able to embryonate into the infective stage, and PCR-RFLP analysis on the ITS region amplified from single embryonated eggs suggest these to be *Ascaris suum*. In addition, sequence analysis of the *cox1* gene ('barcoding') on expelled worms followed by cluster analysis revealed that the chimpanzees were infected with pig *A. suum* which now, in spite of control efforts, has stabilized into a permanent transmission cycle in the Zoo's chimpanzee troop. In addition, an ascarid worm expelled from a gorilla (*Gorilla g. gorilla*) in Tierpark Hellabrunn, the Zoo in Munich, Germany was also found to be of porcine origin. The fecal egg count was 210 eggs per gram of feces. Despite the lack of reliable morphological traits to distinguish between *Ascaris* eggs or worms from humans and pigs, cases of ascarid infection among non-human primates are often designated *A. lumbricoides*. However, our findings strongly suggest that *A. suum* from pigs may be a more likely source of the infection in laboratory and zoo maintained non-human primates, at least in areas considered non-endemic for *A. lumbricoides*.



The XIIth International Congress of Parasitology

Melbourne, Australia
15th – 20th August 2010

